

11-3 Practice**Geometric Sequences**

$$a_n = a_1 \cdot r^{n-1}$$

Find the next two terms of each geometric sequence.

(1) $-15, -30, -60, \dots -120, -240$

2. $80, 40, 20, \dots$

$r = 2$

3. $90, 30, 10, \dots$

(4) $-1458, 486, -162, \dots 54, -18$

(5) $\frac{1}{4}, \frac{3}{8}, \frac{9}{16}, \dots \frac{27}{32}, \frac{81}{64}$

6. $216, 144, 96, \dots$

Find the first five terms of each geometric sequence described.

7. $a_1 = -1, r = -3$

8. $a_1 = 7, r = -4$

(9) $a_1 = -\frac{1}{3}, r = 2$

10. $a_1 = 12, r = \frac{2}{3}$

Find the indicated term of each geometric sequence.

11. $a_1 = 5, r = 3, n = 6$

12. $a_1 = 20, r = -3, n = 6$

(13) $a_1 = -4, r = -2, n = 10$

(14) a_8 for $-\frac{1}{250}, -\frac{1}{50}, -\frac{1}{10}, \dots$

15. a_{12} for $96, 48, 24, \dots$

16. $a_1 = 8, r = \frac{1}{2}, n = 9$

17. $a_1 = -3125, r = -\frac{1}{5}, n = 9$

(18) $a_1 = 3, r = \frac{1}{10}, n = 8$

Write an equation for the n th term of each geometric sequence.

(19) $1, 4, 16, \dots a_n = 1(4)^{n-1}$

20. $-1, -5, -25, \dots$

(21) $1, \frac{1}{2}, \frac{1}{4}, \dots a_n = 1(\frac{1}{2})^{n-1}$

22. $-3, -6, -12, \dots$

(23) $7, -14, 28, \dots a_n = 7(-2)^{n-1}$

24. $-5, -30, -180, \dots$

Find the geometric means in each sequence.

25. $3, _, _, _, 768$

(26) $5, _, _, _, 1280$

27. $144, _, _, _, 9$

(28) $37,500, _, _, _, -12$

(29) **BIOLOGY** A culture initially contains 200 bacteria. If the number of bacteria doubles every 2 hours, how many bacteria will be in the culture at the end of 12 hours?30. **LIGHT** If each foot of water in a lake screens out 60% of the light above, what percent of the light passes through 5 feet of water?31. **INVESTING** Raul invests \$1000 in a savings account that earns 5% interest compounded annually. How much money will he have in the account at the end of 5 years?

11-4 Practice**Geometric Series**Find S_n for each geometric series described.

1. $a_1 = 2, a_6 = 64, r = 2$
 $S_6 = \frac{2(2^6 - 1)}{2 - 1} = 126$

2. $a_1 = 160, a_6 = 5, r = \frac{1}{2}$

3. $a_1 = -3, a_n = -192, r = -2$

$S_n = \frac{-3 - (-2)(-192)}{1 - (-2)} = -129$

7. $a_1 = 5, r = 3, n = 9$

9. $a_1 = -6, r = -3, n = 7$
 $S_7 = \frac{-6(1 - (-3)^7)}{1 - (-3)} = \frac{4}{3}(1 - 3^{10})$

11. $a_1 = \frac{1}{3}, r = 3, n = 10$
 $S_{10} = \frac{\frac{1}{3}(3^{10} - 1)}{3 - 1} = \frac{2954}{3}$

Find the sum of each geometric series.

13. $162 + 54 + 18 + \dots$
 $\sum_{n=1}^{10} 162 \left(\frac{1}{3}\right)^{n-1} = 243$

15. $64 - 96 + 144 - \dots$ to 7 terms

17. $\sum_{n=1}^8 (-3)^{n-1}$

20. $\sum_{n=1}^6 \left(\frac{1}{2}\right)^{n-1}$

Find the indicated term for each geometric series described.

23. $S_n = 1023, a_n = 768, r = 4; a_1$
 $1023 = \frac{a_1(4^n - 1)}{4 - 1}$
 $768 = a_1(4^n - 1)$
 $3 = a_1$

25. $S_n = -1365, n = 12, r = -2; a_1$
 $-1365 = \frac{a_1(1 - (-2)^{12})}{1 - (-2)}$
 $-1365 = \frac{a_1(4095 - 1)}{3}$
 $-1365 = \frac{a_1(4094)}{3}$
 $-4095 = -4095 a_1$
 $a_1 = 1$

27. CONSTRUCTION A pile driver drives a post 27 inches into the ground on its first hit.Each additional hit drives the post $\frac{2}{3}$ the distance of the prior hit. Find the total distance the post has been driven after 5 hits.

$a_1 = 27$
 $r = \frac{2}{3}$

$S_5 = \frac{27(1 - (\frac{2}{3})^5)}{1 - \frac{2}{3}} = 70\frac{1}{3} \text{ in}$

28. COMMUNICATIONS Hugh Moore e-mails a joke to 5 friends on Sunday morning. Each of these friends e-mails the joke to 5 of her or his friends on Monday morning, and so on. Assuming no duplication, how many people will have heard the joke by the end of Saturday, not including Hugh?

$a_1 = 5$
 $r = 5$

$S_7 = \frac{5(1 - 5^7)}{1 - 5}$

$97,655 \text{ people}$

$S_n = \frac{a_1 - r a_n}{1 - r}$

$S_n = \frac{a_1(1 - r^n)}{1 - r}$

4. $a_1 = -81, a_n = -16, r = -\frac{2}{3}$
 $S_n = \frac{-81 - (-\frac{2}{3})(-16)}{1 - (-\frac{2}{3})} = -55$

6. $a_1 = 54, a_6 = \frac{2}{9}, r = \frac{1}{3}$

8. $a_1 = -6, r = -1, n = 21$

10. $a_1 = -9, r = \frac{2}{3}, n = 4$

12. $a_1 = 16, r = -1.5, n = 6$

#13 Put in sigma notation

14. $2 + 4 + 8 + \dots$
 $\sum_{n=1}^6 2(2)^{n-1}$

16. $\frac{1}{9} - \frac{1}{3} + 1 - \dots$ to 6 terms

18. $\sum_{n=1}^9 5(-2)^{n-1}$
 $5 - (-2)(1250)$
 $1 - (-2)$
 $= 855$

21. $\sum_{n=1}^{10} 2560\left(\frac{1}{2}\right)^{n-1}$

22. $\sum_{n=1}^4 9\left(\frac{2}{3}\right)^{n-1}$
 $S_4 = \frac{9 - (\frac{2}{3})(\frac{8}{3})}{1 - \frac{2}{3}} = \frac{65}{3}$